REMARKS

Request for Reconsideration, Informal Matters, Claims Pending

The non-final Official action mailed on 2 October 2002 has been considered carefully. Reconsideration of the claimed invention in view of the amendments above and the discussion below is respectfully requested.

Claim 12 has been canceled, rendering moot the rejection under 35 USC 112, 2nd paragraph.

Claims 1-11 and 13-23 are pending.

Response to Objections to the Drawings & Specification

Regarding FIG. 4, the Applicants respectfully decline to adopt the Examiner's recommendation to revise the description of block "420" to read - - Use course altitude to estimate 3D location including derived altitude - -. Those skilled in the art recognize that a 3D location computation inherently includes altitude. Thus the proposed new language is redundant.

The specification has been amended on page 3, line 23 and on page 4, line 26 as suggested by the Examiner.

The applicants decline to adopt the Examiner's suggestion to revise references to the location determinations as estimated, intermediate and final. The antecedent bases provided in the specification, including the description and claims make clear the nature of the location determinations at issue.

All of the informal objections to the drawings and specification have been addressed in view of the foregoing discussion.

Allowability of Claims Over Fuchs

Claims 1-4, 6-9 and 15-21 stand rejected under 35 USC 102(e) for anticipation by US 6,453,237 (Fuchs).

In FIG. 1, Fuchs discloses a location system (100) based upon a real-time wide area inverse differential GPS constellation model, which is developed with a network of fixed site GPS receivers (110). Fuchs computes the location of GPS receivers at a location server (120) using the GPS model and pseudorange information provided by GPS receivers. Fuchs, col. 4, lines 5-13, col. 5, lines 59-65. The GPS constellation model of Fuchs is for use in areas where GPS coverage is sparse, e.g., indoors, and where there is significant latency (delay), e.g., in paging and other networks unable to provide real-time communications. Fuchs, col. 4, lines 1-5, col. 5, line 52–col. 6, line 34.

Arguments Supporting Allowance of Claims 1 & 6

Regarding Claim 1, contrary to the Examiner's assertions, Fuchs does not disclose or suggest a method "... in a satellite positioning system receiver..." comprising:

> ... determining an estimated location of the receiver at the receiver;
> transmitting the estimated location to a network;
> receiving from the network altitude information based upon the estimated location of the receiver;

determining a new location of the receiver at the receiver based upon the altitude information received from the network.

Regarding independent Claim 6, contrary to the Examiner's assertions, Fuchs does not disclose a method "... in a satellite positioning system receiver ..." comprising:

determining an estimated location of the receiver;
determining a reference altitude of the receiver based upon the estimated location of the receiver;
determining a new location of the receiver based upon the reference altitude information received.

In Fuchs, GPS receiver location is computed at a network location server, Fuchs, col. 4, lines 7-16, not at the receiver. There is no suggestion in Fuchs to compute location at the GPS receiver, since Fuchs requires use of the real-time GPS constellation model for computing GPS receiver locations at the network location server. Independent Claims 1 and 6 and the claims that depend therefrom are therefore patentably distinguished over Fuchs and in condition for allowance.

Arguments Supporting Allowance of Claim 15

Regarding independent Claim 15, contrary to the Examiner's assertions, Fuchs does not disclose a satellite positioning system receiver location method, comprising:

determining, at the receiver, an estimated location of the receiver based upon a coarse altitude;

transmitting the estimated location of the receiver to a network;

determining a reference altitude of the receiver at the network based upon the estimated location of the receiver;

determining a new location of the receiver based upon the reference altitude of the receiver.

In Fuchs, the wireless network (114) determines a rough estimate of the receiver and the network sends the rough estimate along with a position request to a position server (120). Fuchs, col. 6, lines 43-51. Thus, Fuchs does not disclose "...determining, at the receiver, an estimated location of the receiver based upon a coarse altitude ..." as recited in Claim 15. And since Fuchs does not determine the estimate location of receiver at the receiver, Fuchs does not disclose or suggest "... transmitting the estimated location of the receiver to a network ...." Claim 15 and the claims that depend therefrom are thus patentably distinguished over Fuchs.

Argument Supporting Allowance of Claims 2, 8 & 17

Claims 2, 8 and 17 are patentably distinguished over Fuchs for at least the same reasons as the base and any intervening claims. Regarding Claims 2, Fuchs does not disclose "... receiving from the network altitude information based upon the estimated location of the receiver..." as recited in base Claim 1. Regarding Claim 8, Fuchs does not determine at the receiver "... a new location of the receiver based upon the reference altitude information received." Regarding Claim 17, Fuchs does not determine "... the estimated location of the receiver based upon a coarse altitude of the receiver" at the receiver.

Argument Supporting Allowance of Claims 3, 9, 18 & 20

Claims 3, 9, 18 and 20 are patentably distinguished over Fuchs for at least the same reasons as the base and any intervening claims.

Regarding Claims 3, amended to depend from Claim 1, Fuchs does not disclose or suggest

> ... determining a derived altitude based upon the estimated location of the receiver, the altitude information from the network including a reference altitude, determining the new location of the receiver if a difference between the derived and reference altitudes is outside an altitude threshold.

Regarding Claim 9, amended to depend from Claim 7, Fuchs does not disclose or suggest

> ... determining a derived altitude from a 3-dimensional estimated location of the receiver, determining the new location of the receiver if a difference between the derived altitude and the reference altitude of the receiver is outside an altitude threshold.

Regarding amended Claim 18, dependent from Claim 15, Fuchs does not disclose or suggest "... determining the new location of the receiver only if a difference between the coarse and reference altitudes is outside an altitude threshold."

Regarding amended Claim 20, amend to depend from Claim 15, Fuchs does not disclose or suggest

> ... determining a difference between the derived altitude and the reference altitude, determining a corrected location of the receiver based upon the satellite information and the difference.

For the rejections of Claim 3, 9, 18 and 20, the Examiner relies on Fuch's teaching to test the receiver position or time solution against a known reference to determine whether there is agreement within some reasonable bounds. In the subject matter of Claims 3, 9, 18 and 20, there is no known reference as in Fuchs. Instead, the claimed inventions cover the idea of determining whether iterative solutions are converging toward some value by considering a difference between solutions. Fuch's depends upon the use of a known reference. Claim 3, 9, 18 and 20 are thus patentably distinguished over Fuchs.

Argument Supporting Allowance of Claim 4

Claim 4 is patentably distinguished over Fuchs for at least the same reasons as Claim 1 and intervening in Claim 2. Fuchs does not disclose or suggest "... requesting [from a mobile receiver] and receiving the coarse altitude from the network". As noted above, Fuchs computes the estimate location of the receiver at the network (114). Thus there is no reason for Fuchs provide course coarse altitude to the receiver fro computing an estimate location as recited in Claim 4. Claim 4 is thus patentably distinguished over Fuchs.

Argument Supporting Allowance of Claims 7 & 16

Claims 7 and 16 are patentably distinguished over Fuchs for at least the same reasons as the base and any intervening claims.

Regarding Claims 7, amended to depend from Claim 1, Fuchs does not disclose or suggest "... determining the reference altitude of the

receiver by using the estimated location to index the reference altitude in a map database" at the receiver. Fuchs performs any similar function at the network or location server (120).

Regarding Claim 16, dependent from Claim 15, Fuch does not dislcose or suggest "... determining the reference altitude of the receiver by using the estimated location to index the reference altitude of the receiver in a map database on the network" in combination with the limitations of Claim 15.

Claims 7 and 16 are thus patentably distinguished over Fuchs.

Argument Supporting Allowance of Claim 21

Claim 21 is patentably distinguished over Fuchs for at least the same reasons as base Claim 15 and any intervening claims. Moreover, Fuchs fails to disclose or suggest

> ... transmitting weighting factors used to determine the estimated location of the receiver to the network, determining a corrected location of the receiver based upon the satellite information, the weighting factors, and the difference between the derived altitude and the reference altitude at the network.

As noted above, Fuchs does not determine the estimated location of the receiver at the receiver, and therefore there is no reason for Fuchs to send "... weighting factors used to determine the estimated location of the receiver to the network...." Fuchs determines the estimated location of the receiver at the network. Fuchs, col. 6, lines 42-48.

Claim 21 is thus patentably distinguished over Fuchs.

Allowability of Claims Over Brown

Claims 1-2 and 6-8 stand rejected under 35 U.S.C. 102 for anticipation by US 5,225,842 (Brown).

Brown is concerned generally with simultaneously computing the location of large numbers of vehicle in a common area, on the order of 100 kilometers, at a master station. In FIG. 1, particularly, Brown computes the location of each sensor (20) at a Vehicle Location Station (VLS) 40 based upon data reported by the sensor (20) from less than four satellites by estimating vehicle altitude from a digital map at the VLS (40). Brown, col. 7, lines 9-11.

Argument Supporting Allowance of Claims 1, 2, 6, 7 & 8

Regarding Claim 1, contrary to the Examiner's assertion, Brown does not disclose or suggest a "...method in a satellite positioning system receiver ..." comprising

> determining an estimated location of the receiver at the receiver;
> transmitting the estimated location to a network;
> receiving from the network altitude information based upon the estimated location of the receiver;
> determining a new location of the receiver at the receiver based upon the altitude information received from the network.

Brown sends satellite measurement information from the sensor to the VLS (40) for computation of the sensor location at the VLS (40). Brown does not disclose or suggest "... receiving from the network altitude information based upon the estimated location of the receiver..." and "...

determining a new location of the receiver at the receiver based upon the altitude information received from the network." In Brown, sensor location is computed at the network, not at the sensor (20). Brown also fails compute a new location based upon altitude information determined from an estimated location.

Regarding Claim 6, contrary to the Examiner's assertion, Brown does not disclose or suggest a "... method in a satellite positioning system receiver ..." including

> determining an estimated location of the receiver;
> determining a reference altitude of the receiver based upon the estimated location of the receiver;
> determining a new location of the receiver based upon the reference altitude.

As noted above, Brown computes sensor (20) location at the VLS (40). In Claim 6, all processing occurs "in the receiver", not at a location station as in Brown. Moreover, Brown does not disclose or suggest "...determining a new location of the receiver based upon the reference altitude." Brown merely computes a positioning fix based upon pseudorange measurements to three satellites and an estimated altitude. There is no iterative position computation in Brown.

Regarding Claim 7, contrary to the Examiner's assertion, Brown estimates the sensor (20) altitude at the VLS (40), not at the sensor.

Regarding Claims 2 and 8, Brown does not determine an "... estimated location of the receiver based upon a coarse altitude of the receiver." Contrary to the Examiner's assertion, there is no indication in Brown that the initial position estimate transmitted by the master station to the sensor is based upon coarse altitude. The position estimate information in Brown is equivalent

to satellite selection table information that indicates from which satellites the sensor should obtain measurement data within the specified area. Brown makes absolutely no suggestion to use coarse altitude, as recited in these claims.

Claims 1, 2, 6, 7 and 8 are therefore patentably distinguished over Brown.

Allowability of Claims Over Hayashi

Claims 6, 8 and 9 stand rejected under 35 U.S.C. 102 for anticipation by US 5,434,574 (Hayashi). Claim 7 stands rejected under 35 U.S.C. 103 as being obviousness in view of Hayashi.

Hayashi discloses quantitative relationship for calculating altitude for use in computing position with measurements from less than four satellites. The altitude computation in Hiyahsi is based upon a prior altitude measurement, a manometer reading, and a smoothing coefficient. Hiyashi, col. 3, lines 27-44.

Argument Supporting Allowance of Claims 6, 8 & 9

Regarding Claim 6, contrary to the Examiner's assertion, Brown does not disclose or suggest a "... method in a satellite positioning system receiver ..." including

> determining an estimated location of the receiver;
> determining a reference altitude of the receiver based upon the estimated location of the receiver;
> determining a new location of the receiver based upon the reference altitude.

As noted above, Hiyashi calculates altitude based upon a prior altitude measurement, a manometer reading, and the smoothing function. Thus Hiyashi does not determine "... a reference altitude of the receiver based upon the estimated location of the receiver ...." Hiyahsi also fails to determine "... a new location of the receiver based upon the reference altitude." Moreover, Hiyashi does not suggest performing the forgoing steps in a "satellite positioning system receiver".

Regarding Claim 7, contrary to the Examiner's assertion, Hiyashi does not suggest "... determining the reference altitude of the receiver by using the estimated location to index the reference altitude in a map database. Hiyashi computes the estimated altitude based upon a prior computed altitude, a (manometer) measured altitude, and the smoothing coefficient.

Regarding Claim 8, contrary to the Examiner's assertion, Hiyashi does not determine an "... estimated location of the receiver based upon a coarse altitude of the receiver." As noted, Hiyashi computes the estimated altitude based upon a prior computed altitude, a (manometer) measured altitude, and the smoothing coefficient.

Claim 9 has been amended to depend from Claim 7, which is not the subject of the rejection based upon Hiyashi.

Claims 6, 8 and 9 are therefore patentably distinguished over Hiyashi.

(Continued on following page.)

Allowability of Claims Over Sheynblat

Claims 6-9 stand rejected under 35 U.S.C. 102 for anticipation by US 6,061,018 (Sheynblat).

Sheynblat discloses computation of GPS receiver location at a GPS server based upon satellite measurements provided by a GPS receiver and based upon cell site information. Sheynblat, col. 9, lines 16-25.

Argument Supporting Allowance of Claims 6, 8 & 9

Regarding Claim 6, contrary to the Examiner's assertion, Brown does not disclose or suggest a "... method in a satellite positioning system receiver ..." including

> determining an estimated location of the receiver;
> determining a reference altitude of the receiver based upon the estimated location of the receiver;
> determining a new location of the receiver based upon the reference altitude.

As noted above, Sheynblat computes location at the network. Thus Sheynblat does not determine "... a reference altitude of the receiver based upon the estimated location of the receiver ..." determined at the receiver. Sheynblat determines the estimated receiver location at the network based upon cell site or cell object information. Sheynblat, col. 9, lines 30-49.

Regarding Claim 7, contrary to the Examiner's assertion, Sheynblat fails to disclose or suggest "... determining the reference altitude of the receiver by using the estimated location to index the reference altitude in a

map database" in a receiver. As noted, Sheyblat determines receiver altitude at the GPS server, not at the receiver.

Regarding Claim 8, Sheynblat does not determine an "... estimated location of the receiver based upon a coarse altitude of the receiver." As noted, Sheynblat computes the estimated altitude based upon a prior computed altitude, a (manometer) measured altitude, and the smoothing coefficient.

Regarding Claim 9, contrary to the Examiner's assertion, Sheynblat does not determine a "... derived altitude from a 3-dimensional estimated location of the receiver, determining the new location of the receiver if a difference between the derived altitude and the reference altitude of the receiver is outside an altitude threshold." Sheynblat discloses identifying faulty measurements and computation calculations if a difference between calculated and measured altitudes is sufficiently great.

Claims 6 –9 are therefore patentably distinguished over Sheynblat.

Allowability of Claims Over Fernandez

Claims 6-8 and 11-12 stand rejected under 35 U.S.C. 102 for anticipation by US 6,289,280 (Fernandez).

Fernandez discloses a non-iterative approach to computing the location of a mobile station (MS) based upon a set of equations based on GPS satellite measurements, terrestrial network measurements, time measurements, and altitude measurement equations. Fernandez, col. 6, lines 29-53. In Fernandez, measurement equations are linearized around an initial estimate of the MS's location accurate to within 10-15 km. Fernandez, line 54- col. 7, line 8.

Argument Supporting Allowance of Claims 6-8 and 11-12

Regarding Claim 6, contrary to the Examiner's assertion, Fernandez does not disclose or suggest a "... method in a satellite positioning system receiver..." including

> determining an estimated location of the receiver;
> determining a reference altitude of the receiver based upon the estimated location of the receiver;
> determining a new location of the receiver based upon the reference altitude.

As noted, Fernandez non-iteratively computes location based upon altitude and other measurement, which is linearized relative to an approximate position. In Fernandez, at col. 7, lines 45-51, referenced by the Examiner, Fernandez discloses iteratively computing locations based upon prior location computations. Fernandez, however, does not disclose or suggest "... determining a reference altitude of the receiver based upon the estimated location of the receiver; determining a new location of the receiver based upon the reference altitude" as recited in Claim 6.

Regarding Claim 7, contrary to the Examiner's assertion, Fernandez fails to disclose or suggest "... determining the reference altitude of the receiver by using the estimated location to index the reference altitude in a map database" in a receiver. Moreover, Fernandez makes no reference to performing these operations "... in a satellite positioning system receiver...."

Regarding Claim 8, Fernandez does not determine an "... estimated location of the receiver based upon a coarse altitude of the receiver."

Rather, Fernandez determines altitude based upon an estimated location, e.g., cell location.

Regarding Claim 11, contrary to the Examiner's assertion, Fernandez does not disclose or suggest determining "... the reference altitude of the receiver based upon the estimated location of the receiver and based upon 3-dimensional location fix altitude information."

Claims 6 –8 and 11 are therefore patentably distinguished over Fernandez.

Allowability of Claims Over Fuchs or Brown or Hiyashi Or Sheynblat or Fernandez in View of Nelson

Claims 5 and 10-14 stand rejected under 35 U.S.C. 103 as being unpatentably over Fuchs or alternatively Brown in view of US 5,890,090 (Nelson). Claims 10-14 stand rejected under 35 U.S.C. 103 as being unpatentably over Sheynblat or Hiyashi in view of Nelson. Claims 10 and 13-14 stand rejected under 35 U.S.C. 103 as being unpatentably over Fernandez in view of Nelson.

Regarding Claim 5, 10, and 13-14, Nelson is relied upon for suggesting receiving and/or using "...terrain slope estimates..." in combination with the primary references cited. Contrary to the examiner assertion, however, there is no disclosure or suggestion in Nelson or other references cited for receiving or using terrain slope information as delimited in the rejected claims. The Examiner, apparently conceding this point, bases the rejection of these claims upon the unsupported assertion that determining altitude velocity is equivalent to determining terrain slope.

Regarding Claim 11, Nelson also fails to disclose or suggest "... determining the reference altitude of the receiver based upon the estimated location of the receiver and based upon 3-dimensional location fix altitude information." The Examiner's rejection of Claim 11 is based on a bald assertion of obviousness unsupported by Nelson and the other primary references.

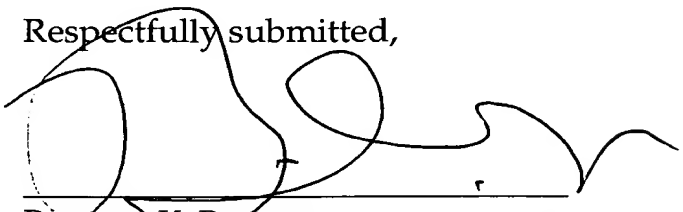
The Applicants hereby demand that the Examiner cite prior art references supporting the rejections of the foregoing Claims for obviousness based upon putative facts outside the record. See MPEP 2144.03. Meanwhile, kindly withdraw the unsubstantiated rejections.

New Claims 22 and 23 are also patentably distinguished over the art of record.

In view of the amendments and the discussion above, the Claims of the present application are in condition for allowance. Kindly withdraw any rejections and objections and allow this application to issue as a United States Patent without further delay.

A telephone interview with the Examiner is requested. Kindly contact the undersigned upon carefully reviewing the foregoing amendment and discussion, prior to preparing an official action in response thereto.

Respectfully submitted,



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MARKED-UP AMENDED SPECIFICATION

In the Description:

Page 3, the paragraph beginning at line 23:

In FIG. 2, at block 210, a reference [~~referenced~~] altitude of the receiver is determined based upon the estimated location, for example by using latitude and longitude information from the estimated location to index the reference altitude on a terrain map or database. In one embodiment, in FIG. 3, the estimated location determined at the receiver is transmitted to the network at block 312, and the network determines the reference altitude of the receiver based upon the estimated location of the receiver at block 314. In another embodiment, the reference altitude of the receiver is determined at the receiver, for example based upon altitude data stored on the receiver, for example by averaging 3-dimensional position fixes stored previously in memory on the receiver, simply by using the last known altitude from a most recently determined last 3-dimensional position fix, or by utilizing the output of an altitude sensor or other devices. These devices can be either attached or integrated to the receiver or communicate remotely with the receiver from their own locations.

Page 4, the paragraph beginning at line 26:

In FIG. 4, coarse altitude, obtained at block 410, is used to determine the estimated location of the receiver at block 420. In one embodiment, the coarse altitude is the average altitude of the serving cell site or portion thereof or altitude of the base station antenna. The course altitude may be communicated to the receiver in applications where the receiver determines the estimated location. In another embodiment, the coarse altitude is obtained from altitude data stored on the receiver, for example by averaging 3-dimensional position fixes stored at the receiver, simply by using the last known altitude from a most recently determined last 3-dimensional position fix, or by utilizing the output of an altitude sensor or other devices. For instance, a barometer could be attached to the receiver to determine [~~derive~~] an altitude. A bluetooth transmitter could be installed in different floors to derive an altitude, which is then being received remotely by the mobile receiver. In another embodiment, the receiver is assumed to be at Mean Sea Level (MSL), and a table having MSL deviations from the reference ellipsoid is used to determine a GPS altitude above the referenced ellipsoid.

In The Claims:

3. (Once Amended) The method of Claim 1 [~~2~~], determining a derived altitude based upon the estimated location of the receiver, the altitude information from the network including a reference altitude, determining the new location of the receiver if a difference between the derived and reference altitudes is outside an altitude threshold.

6. (Once Amended) A method in a satellite positioning system receiver, comprising:

determining an estimated location of the receiver;

determining a reference altitude of the receiver based upon the estimated location of the receiver;

determining a new location of the receiver based upon the reference altitude [~~information received~~].

9. (Once Amended) The method of Claim 7 [~~8~~], determining a derived altitude from a 3-dimensional estimated location of the receiver, determining the new location of the receiver if a difference between the derived altitude and the reference altitude of the receiver is outside an altitude threshold.

10. (Once Amended) The method of Claim 6, determining the new location at the receiver based upon the reference altitude of the receiver and terrain slope information [~~at~~] for the estimated location.

11. (Once Amended) The method of Claim 6, [~~storing 3-dimensional location fixes of the receiver on the receiver,~~] determining the reference altitude of the receiver [~~with~~] based upon the estimated location of the receiver and based upon [~~by averaging~~] 3-dimensional location fix altitude information [~~fixes stored on the receiver~~].

Claim 12 was without prejudice.

13. (Once Amended) The method of Claim 6,

determining the estimated location with a coarse altitude,

determining [~~a~~] the reference altitude and terrain slope information at the estimated location,

updating the estimated location with the reference altitude and the terrain slope information.

14. (Once Amended) The method of Claim 6,

determining the estimated location with a coarse altitude,

determining [~~a~~] the reference altitude [~~and~~] with terrain slope information [~~at~~] in the vicinity of the estimated location,

~~[updating the estimated location with the reference altitude,~~

~~determining a change in estimated location of two most recent estimated location determinations,~~

~~revising the reference altitude using the change in location and terrain slope information,~~

~~updating the estimated location with the revised reference altitude.~~

15. (Once Amended) A satellite positioning system receiver location method, comprising:

determining, at the receiver, an estimated location of the receiver [~~based upon a coarse altitude~~];

transmitting the estimated location of the receiver to a network;

determining a reference altitude of the receiver at the network based upon the estimated location of the receiver;

determining a new location of the receiver based upon the reference altitude of the receiver.

18. (Once Amended) The method of Claim 17, [~~the estimated location is a 3-dimensional location fix, determining a derived altitude from the estimated location,~~] determining the new location of the receiver only if a difference between the [~~derived~~] coarse and reference altitudes is outside an altitude threshold.

20. (Once Amended) The method of Claim 15 [~~17~~],

the estimated location is a 3-dimensional location fix, determining a derived altitude from the estimated location,

transmitting satellite information used to determine the 3-dimensional location fix of the receiver to the network,

determining a difference between the derived altitude and the reference altitude, determining a corrected location of the receiver based upon the satellite information and the difference.

21. (Once Amended) The method of Claim 20, transmitting [~~satellite information and~~] weighting factors used to determine the estimated location of the receiver to the network, determining a corrected location of the receiver based upon the satellite information, the weighting factors, and the difference between the derived altitude and the reference altitude [~~of the receiver determined~~] at the network.